

**REMARKS/ARGUMENTS**

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and amended as necessary to more clearly and particularly describe the subject matter that Applicant regards as the invention.

Reconsideration of the subject patent application in view of the present remarks is respectfully requested.

Claims 1-13 and 18 are cancelled.

Claims 14 and 22-23 are amended.

***Claim Rejections - 35 USC § 112***

Claims 14-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 14 has been amended to comply with 35 U.S.C. 112, second paragraph. Thus, the rejection as it applied to claims 14-23 is moot.

***Claim Rejections - 35 USC § 102***

Claims 14, 15, 18, 19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Kub et al. (6,555,451; hereinafter "Kub"). Applicants respectfully request withdrawal of the rejection for at least the following reasons.

Claim 18 has been cancelled. Thus, the rejection as it applies to claim 18 is moot.

Regarding the amended claim 14, Kub does not disclose the step of **radiating inactive plasma** to the semiconductor substrate after the impurity introducing step. In Kub, two steps using plasma are described in column 6, line 37 and column 7, line 27. The former one is a step of removing native oxide and hydrogen terminating with low energy hydrogen plasma and HF vapor. The latter one is a step of stripping the resist formed on the substrate with plasma. These two processes are **chemically active**. On the other hand, the plasma radiation of claim 14 is **not chemically active**. Therefore, the plasma radiation process of claim 14 is not disclosed in Kub. Thus, withdrawal of the rejection as it applies to claim 14 is respectfully requested.

Claims 15, 19 and 21 which are dependent from claim 14 should also be allowable for at least the same reason.

#### ***Claim Rejections - 35 USC § 103***

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kub in view of Nishikawa et al (6,890,605 B2; hereinafter "Nishikawa"). Applicants respectfully request withdrawal of the rejection for at least the following reasons.

Claims 16 and 17 are directly or indirectly dependent from claim 14. Thus, all of the limitations of claim 14 are included in claims 16 and 17.

Regarding claims 16 and 17, neither Kub nor Nishikawa, alone or in combination, discloses, teaches or renders foreseeable the step of **radiating inactive plasma** to the semiconductor substrate after the impurity introducing step. Kub does not disclose the above step, as discussed above regarding claim 14. Although Nishuikawa discloses several plasma

treatments, none of the plasma treatments disclosed in Nishuikawa includes a step of **radiating inactive plasma** to the semiconductor substrate after the impurity introducing step. Therefore, the asserted combination of Kub and Nishikawa does not render claims 16 and 17 obvious. Thus, withdrawal of the rejection as it applies to claims 16 and 17 is respectfully requested.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kub in view of Koh et al (US 2005/0250317; hereinafter "Koh"). Applicants respectfully request withdrawal of the rejection for at least the following reasons.

Claim 20 is dependent from claim 14. Thus, all of the limitations of claim 14 are included in claim 20.

Regarding claim 20, neither Kub nor Koh, alone or in combination, discloses, teaches or renders foreseeable the step of **radiating inactive plasma** to the semiconductor substrate after the impurity introducing step. Kub does not disclose the above step, as discussed above regarding claim 14. Koh merely discloses that ion implantation may be replaced with plasma doping (Koh; page 14, paragraph [0260]). There is no disclosure in Koh that the Koh's method includes the step of **radiating inactive plasma** to the semiconductor substrate after the impurity introducing step. Accordingly, the combination of Kub and Koh does not meet all of the limitations of claim 20. Therefore, the asserted combination of Kub and Koh does not render claim 20 obvious. Thus, withdrawal of the rejection as it applies to claim 20 is respectfully requested.

Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kub in view of Momose et al (US 2005/0224898 A1; hereinafter "Momose"). Applicants respectfully request withdrawal of the rejection for at least the following reasons.

Regarding claim 22, neither Kub nor Momose, alone or in combination, discloses, teaches or renders foreseeable the impurity concentration profile in which the impurity concentration at a depth position of 4nm is set to be 1/10 or more of the impurity concentration on a surface of the semiconductor device. Kub does not disclose the above fact, as admitted by the Examiner in the Office Action. The Office Action states that Momose discloses the above fact on page 4, paragraph [0086] and Figure 2. However, because the impurity concentration at a depth position of 4nm is less than  $10^{19} \text{ cm}^{-3}$  and the impurity concentration on a surface of the semiconductor device is more than  $10^{21} \text{ cm}^{-3}$  without HF dip as shown in Figure 2 of Momose, the impurity concentration at a depth position of 4nm is less than 1/10 of the impurity concentration on a surface of the semiconductor device without HF dip in Momose. Also, because the impurity concentration at a depth position of 4nm is less than  $10^{20} \text{ cm}^{-3}$  and the impurity concentration on a surface of the semiconductor device is more than  $10^{22} \text{ cm}^{-3}$  with HF dip as shown in Figure 2 of Momose, the impurity concentration at a depth position of 4nm is less than 1/10 of the impurity concentration on a surface of the semiconductor device with HF dip in Momose. There is no disclosure in Momose that the impurity concentration at a depth position of 4nm is set to be 1/10 or more of the impurity concentration on a surface of the semiconductor device.

Regarding claim 23, neither Kub nor Momose, alone or in combination, discloses, teaches or renders foreseeable the impurity concentration profile in which the impurity concentration at a depth position of 7nm is set to be 1/100 or more of the impurity concentration on a surface of the semiconductor device. Kub does not disclose the above fact, as admitted by the Examiner in the Office Action. The Office Action states that Momose discloses the above

fact on page 4, paragraph [0086] and Figure 2. However, because the impurity concentration at a depth position of 7nm is less than  $10^{19} \text{ cm}^{-3}$  and the impurity concentration on a surface of the semiconductor device is more than  $10^{21} \text{ cm}^{-3}$  without HF dip as shown in Figure 2 of Momose, the impurity concentration at a depth position of 4nm is less than 1/100 of the impurity concentration on a surface of the semiconductor device without HF dip in Momose. Also, because the impurity concentration at a depth position of 7nm is less than  $10^{20} \text{ cm}^{-3}$  and the impurity concentration on a surface of the semiconductor device is more than  $10^{22} \text{ cm}^{-3}$  with HF dip as shown in Figure 2 of Momose, the impurity concentration at a depth position of 7nm is less than 1/100 of the impurity concentration on a surface of the semiconductor device with HF dip in Momose. There is no disclosure in Momose that the impurity concentration at a depth position of 7nm is set to be 1/100 or more of the impurity concentration on a surface of the semiconductor device.

Accordingly, the combination of Kub and Momose does not meet all of the limitations of claims 22 and 23. Therefore, the asserted combination of Kub and Momose does not render claims 22 and 23 obvious. Thus, withdrawal of the rejection as it applies to claims 22 and 23 is respectfully requested.


In consideration of the foregoing analysis, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

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If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 16-0820, our Order No. NGB-41341.

Respectfully submitted,

PEARNE & GORDON LLP

By:   
Nobuhiko Sukenaga, Reg. No. 39446

1801 East 9th Street  
Suite 1200  
Cleveland, Ohio 44114-3108  
(216) 579-1700

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